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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/922,980	08/06/2001	Diana Xiaobing Ma	005825 USA/ETCH/DRIE	1441

32588 7590 11/07/2002

APPLIED MATERIALS, INC.  
2881 SCOTT BLVD. M/S 2061  
SANTA CLARA, CA 95050

EXAMINER

ROCCHEGIANI, RENZO

ART UNIT	PAPER NUMBER
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2825

DATE MAILED: 11/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/922,980

Applicant(s)

MA ET AL.

Examiner

Renzo N. Rocchegiani

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 and 14-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 14-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of claims 1-11 in Paper No. 2 is acknowledged. Claims 12-13 have been canceled by preliminary amendment. Claims 14-21 have been added by preliminary amendment. The restriction requirement was made over the telephone. Originally the two groups comprised claims 1-11 for group 1 and claims 12-13 for group 2. Group 1 was directed toward a method of forming a device, classified in class 438, while group 2 was directed toward an apparatus to perform the steps in the method of forming a device classified in class 118. The two groups were distinct since the apparatus could be used for a materially different process, such as one that does not include the deposition of copper and the formation of a copper via with barrier and seed layer therein. The same apparatus could be used for example in forming a gate structure. Because the two groups fall into different classifications and require different searches, they would impose undue burden on the examiner. A conversation with Mr. Guenzer on August 19, 2002, resulted in the provisional election of group 1, claims 1-11. Applicant then filed the preliminary amendment canceling claims 12-13 and adding claims 14-21. Examiner has determined that claims 14-21 relate to an invention that is not distinct to the invention claimed in claims 1-11 and thus fall within the same group. This action, thus, addresses all remaining pending claims, i.e. claims 1-11 and 14-21.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites the limitation "said oxide layer" and "said etch stop layer" in line 6. There is insufficient antecedent basis for this limitation in the claim. Examiner suggests amending the claim to recite "said dielectric layer" and "an etch stop layer" respectively.

5. Claim 5 recites the limitation "said oxide layer " and said etch stop" in line 4. There is insufficient antecedent basis for this limitation in the claim. Examiner suggests amending the claim to recite "said dielectric layer" in place of "said oxide layer" and changing "stop layer" on line 1-2, i.e. in the preamble, to "etch stop layer".

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-11, and 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants admitted prior art (See figures and specification of pending application) in view of U.S. Patent No. 4,951,601 (Maydan et al.).

Applicant admits that it is well known in the art to perform a process that

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comprises the steps of patterning a photoresist mask material over a dielectric layer, such as an oxide layer, etching the dielectric layer using the patterned mask down to an etch stop layer, ashing the mask layer, removing the exposed etch stop layer, depositing a barrier layer comprising tantalum in the trench, depositing a copper seed layer wherein either one of the deposition steps are performed via sputtering. (See Fig. 1-5 in application and Background section of Specification).

Applicant points out that the prior art does not teach performing these steps using an apparatus that allows for sub-atmospheric conditions, i.e. vacuum, and wherein the wafer is transferred from one process chamber to the next without breaking the vacuum condition and without exposing the wafer to the atmosphere.

Maydan et al. teaches the use of an apparatus that would allow the transfer of a wafer from one chamber to another while maintaining vacuum conditions and thus without exposing the wafer to the atmosphere, such apparatus being adaptable to any process including but not limited to: chemical etching, vapor deposition, sputtering and heat treatment steps. (col. 2, lines 35-45). Maydan et al. also teaches connecting one or more of these apparatus together so as to combine multiple processes into a batch system. (Fig. 20, col. 11, lines 50-67 and col. 12, lines 1-12).

It would have been obvious to one having ordinary skill in the specific art to combine the teachings of Maydan et al. to the prior art teachings disclosed by applicant to arrive at the claimed invention, since it has been held to be within the level of ordinary engineering skill to convert a process from continuous to batch *In re Dilnot*, 138 USPQ 248 (CCPA 1963).

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***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (703) 308-5839. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached at (703) 308-1323. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9318.

RNR

October 30, 2002



MATTHEW SMITH  
PATENT EXAMINER  
TELEPHONE CENTER 2800